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Docket No.: 325772014200
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:
Kenichi SAWADA

Application No.: 09/484,540 Confirmation No.: 9807

Filed: January 18, 2000 Art Unit: 2623

For: IMAGE PROCESSING APPARATUS Examiner: J. Wu

APPELLANT'S OPENING BRIEF

Customer Window, MS Appeal Brief - Patents
U.S. Patent and Trademark Office
2011 South Clark Place
Crystal Plaza Two, Lobby, Room 1B03
Arlington, Virginia 22202

Dear Sir:

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is Minolta Co., Ltd.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences within the meaning of 37 CFR 1.192(c)(2) known to appellant or appellant's undersigned counsel.

III. STATUS OF CLAIMS

Claims 1-20 and 26-34 (reproduced in the attached Appendix) are pending in this application.

Claims 1, 2, 7-12, 17-20, 26, 27 and 31-34 are finally rejected under 35 USC 103(a) as being unpatentable over Katayama (U.S. Patent No. 5,361,147) in view of Suzuki (U.S. Patent No. 5,742,410).

Claims 4-6, 14-16 and 28-30 are finally rejected under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Tamura (U.S. Patent No. 5,430,557).

Claims 3, 13 and 27 are finally rejected under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Hirata (U.S. Patent No. 5,357,353).

IV. STATUS OF AMENDMENTS

No amendments have been submitted subsequent to the final rejection.

V. SUMMARY OF INVENTION

The invention is directed to an image processing apparatus that can improve the quality of black letters or lines in a color image that is reproduced (pg. 1, lines 9-14). Previously, improving the reproducing quality of black letters or lines included in a color image required that a portion of the black letters or lines in the original image be determined by an area determining process, and image processing such as edge emphasis is performed in accordance with this determination (pg. 1, lines 16-22). However, the prior art method is not sufficient for suppressing color drift and improving the reproducing quality of the black letters or lines (pg. 3, lines 3-7).

According to the invention, the image processing apparatus includes an edge detecting portion for detecting an edge area in an input image and a lightness and chroma detecting portion for detecting a low lightness and low chroma area of the input image (pg. 4, lines 8-13). Image processing is performed for the edge area of black letters or lines in accordance with the detection signals of the edge detecting portion and the chroma detecting portion (pg. 4, lines 13-16). The image processing apparatus also includes an edge enlarging portion for enlarging the edge area detected by the edge detecting portion (pg. 4, lines 17-19) and a density correcting portion for increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion (pg. 4, lines 19-20). The density correcting portion increases at least the density of the black component (pg. 4, line 27 through pg. 5, line 1). Accordingly, color drift can be reduced even when the image reader is a high-definition image reader (pg. 15, lines 12-16). In sum,

according to the invention, an edge portion of the black letters or lines in the input image signal is detected so that the edge area can be enlarged, and the densities of the color components are decreased while the density of the black component is increased for the enlarged area. Therefore, color smear due to misregistration of the image of each color component in an edge portion can be suppressed (pg. 15, lines 17-23).

VI. ISSUES PRESENTED FOR REVIEW

Whether the Examiner erred in rejecting claims 1, 2, 7-12, 17-20, 26, 27 and 31-34 under 35 USC 103(a) as being unpatentable over Katayama in view of Suzuki, claims 4-6, 14-16 and 28-30 under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Tamura, and claims 3, 13 and 27 under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Hirata.

VII. GROUPING OF CLAIMS

For purposes of this appeal brief only, and without conceding the teachings of any prior art reference, the claims have been grouped as indicated below:

Claims 1-20 and 26-34 stand or fall together.

VIII. ARGUMENTS

A. The rejection of claims 1, 2, 7-12, 17-20, 26, 27 and 31-34 as being unpatentable over Katayama in view of Suzuki should be reversed.

Claims 1, 2, 7-12, 17-20, 26, 27 and 31-34 have been finally rejected under 35 USC 103(a) as being unpatentable over Katayama in view of Suzuki.

The invention is directed to a technique for suppressing color drift generated in black letters or lines in images to enhance the reproduction quality when reproducing color images. For that purpose, claim 1 recites "an edge enlarging portion for enlarging the edge area detected by the edge detecting portion" and "a density correcting portion for increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion, wherein the image data

includes a black component and color components, and the **density correcting portion increases at least a density of the black component**." After the edge area is enlarged, the density of the image data of the enlarged edge area is either increased or decreased.

In the final Office Action dated July 21, 2003 (paper no. 12), the Examiner admitted that Katayama does not disclose "wherein the image data includes a black component and color components, and the density correcting portion increases at least a density of the black component." The Examiner asserted that Suzuki teaches this feature. Specifically, the Examiner asserted that "Suzuki, in an analogous environment, discloses increasing at least a density of the black component in the image data includes [sic] color component and black component" (citing col. 4, line 41 – col. 5, line 50 and col. 12, lines 5-65). The Examiner then asserted that it would have been obvious to use the scheme of Suzuki in the method of Katayama in order to accurately enlarge and blacken the edge area for better color conversion. Appellant respectfully asserts that there would have been no motivation to combine Katayama and Suzuki as asserted by the Examiner.

Katayama is directed to a technique for encoding color images without deteriorating image quality. According to Katayama, a black character area is enlarged to eliminate the black character area from the color image in order to encode the color image area but not the black character area. As shown in Fig. 11A, the black character area is encoded by arithmetic encoding 218, while the area other than the black character area is encoded by orthogonal conversion encoding 223. Then the encoded data is transmitted.

Suzuki, on the other hand, is directed to a technique for enhancing reproduction quality of a black character and discloses a process for emphasizing a black character area (edge area). (Col. 4, lines 45-47).

Thus, Katayama teaches a process for eliminating a black character and Suzuki teaches a process for emphasizing a black character. Clearly, these references teach away from each other and one of ordinary skill in the art would not have been motivated to combine the references as suggested by the Examiner.

In the Advisory Action mailed on November 5, 2003 (paper no. 14), the Examiner asserted that the Appellant wrongly asserted that Katayama teaches a process for eliminating a black character and that Katayama and Suzuki teach away from each other. The Examiner asserted that Katayama teaches edge emphasizing of a black character to reproduce an image sharply by first detecting a black character region, forming the detected black character region to form a character frame, then subtracting the black character from the original image to form a hatched portion around the black character, and replacing average color for the hatched portion to overcome the color misregistration, thus emphasizing the black character. The Examiner also asserted that Suzuki teaches detecting and separating a black character edge from the color background, increasing the black density by the density converter and UCR processor, and performing the edge emphasis on the character and portions around the character shows increasing black density. Thus, the Examiner asserted that these references do not teach away from each other.

However, as apparent from Fig. 11A of Katayama, an edge emphasis unit 212 is positioned in a former stage compared to a black character elimination and average value substitution unit 221. More particularly, the edge emphasis and the black character elimination and average value substitution are completely independent from each other and are separate processes. In addition, the process for eliminating a black character to substitute for an average value is completely opposite to the process for emphasizing a black character (an edge), which is well known to those skilled in the art. Further, as previously asserted, according to Katayama, the process for enlarging an edge area is carried out in the black character elimination and average value substitution unit 221.

Accordingly, while it is true that the edge emphasis is performed in Katayama, the edge emphasis process in Katayama is carried out independently of the black character elimination and average value substitution process including the process for enlarging an edge area that is a feature of the claimed invention. Accordingly, there would not have been any motivation to one of ordinary skill in the art combine the edge emphasis unit 212 of Katayama with a density converter of Suzuki. Accordingly, this rejection should be withdrawn.

B. **The rejection of claims 4-6, 14-16 and 28-30 as being unpatentable over Katayama and Suzuki, and further in view of Tamura should be reversed.**

As discussed in A. above, Appellant respectfully submits that there would have been no motivation to combine the teachings of Katayama and Suzuki as asserted by the Examiner. Accordingly, this rejection should be withdrawn.

C. **The rejection of claims 3, 13 and 27 as being unpatentable over Katayama and Suzuki, and further in view of Hirata should be reversed.**

As discussed in A. above, Appellant respectfully submits that there would have been no motivation to combine the teachings of Katayama and Suzuki as asserted by the Examiner. Accordingly, this rejection should be withdrawn.

IX. CONCLUSION

For the foregoing reasons, Appellant respectfully requests that the rejections of claims 1, 2, 7-12, 17-20, 26, 27 and 31-34 under 35 USC 103(a) as being unpatentable over Katayama in view of Suzuki, claims 4-6, 14-16 and 28-30 under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Tamura, and claims 3, 13 and 27 under 35 USC 103(a) as being unpatentable over Katayama and Suzuki, and further in view of Hirata, be withdrawn.

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Respectfully submitted,

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APPENDIX OF APPEALED CLAIMS

1. An image processing apparatus for processing image data indicating a density of each pixel of an image, the apparatus comprising:

an edge detecting portion for detecting an edge area in the image in accordance with the image data;

an edge enlarging portion for enlarging the edge area detected by the edge detecting portion; and

a density correcting portion for increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion,

wherein the image data includes a black component and color components, and the density correcting portion increases at least a density of the black component.

2. The image processing apparatus according to claim 1, wherein the edge detecting portion includes a first order differential filter for operating the first order differential of the image data so as to determine the edge area whose first order differential is larger than a predetermined value.

3. The image processing apparatus according to claim 1, wherein the image data includes a black component and color components, and the density correcting portion increases a density of the black component and decreases the densities of the color components.

4. The image processing apparatus according to claim 1, further comprising a controller for controlling the enlarging degree in the edge enlarging portion.

5. The image processing apparatus according to claim 4, wherein the controller indicates the enlarging degree in accordance with a kind of the image, and the edge enlarging portion changes the enlarging degree in accordance with the indication of the controller.

6. The image processing apparatus according to claim 5, wherein one kind of the image is a monochromatic image and the other kind is a color image.

7. The image processing apparatus according to claim 1, wherein the edge enlarging portion enlarges the edge area inside the image but does not enlarge outside the image.

8. The image processing apparatus according to claim 7, wherein the edge enlarging portion decides the inside and the outside of the image in accordance with the lightness component of the image data.

9. The image processing apparatus according to claim 1, wherein the density correcting portion includes a density detecting portion for calculating an average density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the average density calculated by the density detecting portion.

10. The image processing apparatus according to claim 1, wherein the density correcting portion includes a density detecting portion for calculating a median density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting portion.

11. An image processing apparatus for processing image data indicating a density of each pixel of an image, the apparatus comprising:

an edge detecting portion for detecting an edge area in the image in accordance with the image data;

an edge enlarging portion for enlarging the edge area detected by the edge detecting portion;

a modifying portion for modifying the edge area enlarged by the edge enlarging portion in accordance with the lightness information thereof; and

a density correcting portion for increasing or decreasing the density of the image data of the edge area modified by the modifying portion.

12. The image processing apparatus according to claim 11, wherein the edge detecting portion includes a first order differential filter for operating the first order differential of the image data so as to determine the edge area whose first order differential is larger than a predetermined value.

13. The image processing apparatus according to claim 11, wherein the image data includes a black component and color components, and the density correcting portion increases a density of the black component and decreases the densities of the color components.

14. The image processing apparatus according to claim 11, further comprising a controller for controlling the enlarging degree in the edge enlarging portion.

15. The image processing apparatus according to claim 14, wherein the controller indicates the enlarging degree in accordance with a kind of the image, and the edge enlarging portion changes the enlarging degree in accordance with the indication of the controller.

16. The image processing apparatus according to claim 15, wherein one kind of the image is a monochromatic image and the other kind is a color image.

17. The image processing apparatus according to claim 11, wherein the modifying portion cancel the enlarged edge area enlarged in the outside of the image by the edge enlarging portion.

18. The image processing apparatus according to claim 17, wherein the modifying portion decides the inside and the outside of the image in accordance with the lightness component of the image data.

19. The image processing apparatus according to claim 11, wherein the density correcting portion includes a density detecting portion for calculating an average density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree

of increasing or decreasing each color component in accordance with the average density calculated by the density detecting portion.

20. The image processing apparatus according to claim 11, wherein the density correcting portion includes a density detecting portion for calculating a median density of the image data of the plural pixels included in a predetermined area, and a correcting portion for correcting the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting portion.

26. An image processing method for processing image data indicating a density of each pixel of an image, the method comprising the steps of:

detecting an edge area in the image in accordance with the image data;

enlarging the edge area detected by the edge detecting portion; and

correcting the density by increasing or decreasing the density of the image data of the edge area enlarged by the edge enlarging portion,

wherein the image data includes a black component and color components, and the density correcting portion increases at least a density of the black component.

27. The image processing method according to claim 26, wherein the image data including a black component and color components, and the density correcting step includes increasing a density of the black component and decreasing the densities of the color components.

28. The image processing method according to claim 26, further includes the step of controlling the enlarging degree in the edge enlarging step.

29. The image processing method according to claim 28, wherein the controlling step includes the step of indicating the enlarging degree in accordance with a kind of the image, and the edge enlarging step includes changing the enlarging degree in accordance with the indication of the controlling step.

30. The image processing method according to claim 29, wherein one kind of the image is a monochromatic image and the other kind is a color image.

31. The image processing method according to claim 26, wherein the edge enlarging step includes the step of enlarging the edge area not outside the image but inside the image.

32. The image processing method according to claim 31, wherein the edge enlarging step includes the step of deciding the inside and the outside of the image in accordance with the lightness component of the image data.

33. The image processing method according to claim 26, wherein density correcting step includes the steps of detecting density by calculating an average density of the image data of the plural pixels included in a predetermined area, and changing the degree of increasing or decreasing each color component in accordance with the average density calculated by the density detecting step.

34. The image processing method according to claim 26, wherein density correcting step includes the steps of detecting density by calculating a median density of the image data of the plural pixels included in a predetermined area, and changing the degree of increasing or decreasing each color component in accordance with the median density calculated by the density detecting step.